

Toth et al.

S/N: 10/605,789

In the Claims

1. (Currently Amended) A beam shaping filter assembly comprising:

a first moveable filter having a non-uniform thickness, the first moveable filter having a body, a tail, and a curved portion connecting the body to the tail, the body formed at a first terminal end and the tail extending to a second terminal end opposite the first terminal end, the tail positioned at a distal end of the first moveable filter relative to an x-ray source designed to project x-rays from a focal point, and the body, the curved portion, and the tail constructed to establish an attenuation profile such that a maximum attenuation is defined by the body and a minimum attenuation is defined by the tail;

a second moveable filter independent of the first moveable filter and having a non-uniform thickness, the second moveable filter having a body, a tail, and a curved portion connecting the body of the second filter to the tail of the second filter, the body formed of the second filter at a first terminal end and the tail of the second filter extending to a second terminal end opposite the first terminal end of the second filter, the tail of the second filter positioned at a distal end of the second moveable filter relative to the x-ray source, and the body of the second filter, the curved portion of the second filter, and the tail of the second filter constructed to establish an attenuation profile such that a maximum attenuation is defined by the body of the second filter and a minimum attenuation is defined by the tail of the second filter, and wherein at least one of the first moveable filter and the second moveable filter is configured to be placed in a high frequency electromagnetic energy beam for attenuation of the beam for radiographic data acquisition and wherein the first moveable filter is positioned nearer to the x-ray source focal point than the second movable filter; and

at least one motor assembly configured to independently position a moveable filter such that a beam profile is created that substantially conforms to a shape of a subject to be scanned.

2. (Original) The beam shaping filter assembly of claim 1 wherein the second moveable filter has a shape that mirrors that of the first moveable filter.

3. (Canceled)

Toth et al.

S/N: 10/605,789

4. (Canceled)
5. (Previously Presented) The beam shaping filter assembly of claim 1 wherein the at least one motor assembly is further configured to dynamically position a moveable filter during CT data acquisition.
6. (Original) The beam shaping filter assembly of claim 5 wherein the at least one motor assembly is further configured to dynamically position a moveable filter during CT data acquisition based on a scout scan carried out before CT data acquisition.
7. (Canceled)
8. (Previously Presented) The beam shaping filter assembly of claim 1 wherein a body has a thickness greater than that of a tail.
9. (Previously Presented) The beam shaping filter assembly of claim 1 wherein a body has a thickness of 30 mm and a tail has a thickness of 0.25 mm.
10. (Currently Amended) The beam shaping filter assembly of claim 1:
 - wherein the body base of the first moveable filter has a length along an x-direction of 112 mm;
 - wherein the curved portion of the first moveable filter has a length along the x-direction of 24.9 mm;
 - wherein the tail of the first moveable filter has a length along the x-direction of 135 mm;
 - wherein the body base of the second moveable filter has a length along the x-direction of 53 mm;
 - wherein the tail of the second moveable filter has a length along the x-direction of 168 mm; and
 - wherein the curved portion of the second moveable filter has a length along the x-direction of 34.2 mm.

Toth et al.

S/N: 10/605,789

11. (Previously Presented) A computed tomography (CT) system comprising:
a rotatable gantry having an opening to receive a subject to be scanned;
a high frequency electromagnetic energy projection source configured to project a high frequency electromagnetic energy beam toward the subject;
a pre-subject filter assembly including a pair of filters, each filter defined by a base, tail, and curved portion connecting the base to the tail, and wherein the pair of filters are arranged such that the curved portion of one filter generally faces the high frequency electromagnetic energy projection source and the curved portion of the other filter generally faces the high frequency electromagnetic energy projection source, and wherein the pair of filters are align-able in the high frequency electromagnetic energy beam such that one filter is positioned more proximate the high frequency electromagnetic energy projection source than the other filter;
a scintillator array having a plurality of scintillator cells wherein each cell is configured to detect high frequency electromagnetic energy passing through the subject;
a photodiode array optically coupled to the scintillator array and comprising a plurality of photodiodes configured to detect light output from a corresponding scintillator cell;
a data acquisition system (DAS) connected to the photodiode array and configured to receive photodiode outputs;
an image reconstructor connected to the DAS and configured to reconstruct an image of the subject from the photodiode outputs received by the DAS; and
a controller configured to independently position at least one filter of the pair of filters in the high frequency electromagnetic energy beam so as to modulate the beam to have a profile that substantially matches at least an approximate shape of the subject.

12. (Original) The CT system of claim 11 further comprising a computer programmed to cause application of a scout scan of the subject and from the scout scan determine at least an approximate shape of the subject.

13. (Previously Presented) The CT system of claim 12 wherein the at least one filter is operationally connected to at least one motor that is operationally connected to the controller such that control signals transmitted to the controller by the computer cause the at

Toth et al.

S/N: 10/605,789

least one motor to position the at least one filter in a projection path to modulate the beam to have a desired profile.

14. (Original) The CT system of claim 11 wherein one non-uniform filter has an orientation that mirrors that of another non-uniform filter.

15. (Canceled)

16. (Previously Presented) The CT system of claim 11 wherein the base of each filter is configured to block more x-rays than that of the respective tail.

17. (Previously Presented) An x-ray filter assembly comprising:

a moveable first filter having a curved portion and a moveable second filter having a curved portion, the moveable first filter and the moveable second filter being arranged such that the moveable first filter and the moveable second filter mirror one another relative to a central axis of x-ray projection from an x-ray source toward a subject;

a stationary third filter having a length perpendicular to the central axis of x-ray projection from an x-ray source toward a subject, the length being longer than at least one of the moveable first and the moveable second filters perpendicular to the central axis of x-ray projection and the stationary third filter being positioned more proximate to the subject than either one of the moveable first filter or the moveable second filter;

a first motor assembly connected to the moveable first filter and a second motor assembly connected to the moveable second filter; and

wherein the first and the second motor assemblies are configured to independently position a respective filter in an x-ray path to define an attenuation profile that substantially approximates a target shape.

18. (Previously Presented) The x-ray filter assembly of claim 17 wherein the moveable first filter has a contour different than that of the moveable second filter.

Toth et al.

S/N: 10/605,789

19. (Previously Presented) The x-ray filter assembly of claim 17 wherein the first and the second motor assemblies are further configured to position the moveable first filter and the moveable second filter with respect to one another such that at least a portion of the filters overlap.

20. (Previously Presented) The x-ray filter assembly of claim 17 wherein each moveable filter is defined by a base, the curved portion, and a tail, and wherein the first and the second motor assemblies are further configured to position the moveable first and second filters such that the tail of the moveable first filter is proximate to the tail of the moveable second filter.

21. (Previously Presented) The x-ray filter assembly of claim 17 wherein the stationary third filter provides a non-zero minimum attenuation when the moveable first and second filters are not overlapping.

22. (Original) The x-ray filter assembly of claim 17 incorporated into a CT system.

23. (Original) The x-ray filter assembly of claim 22 wherein the CT system includes a computer programmed to determine the target shape from a scout scan of a subject to be imaged.